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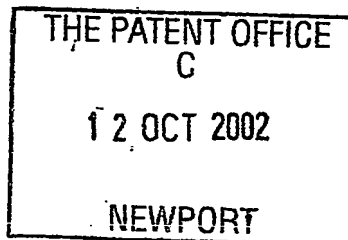
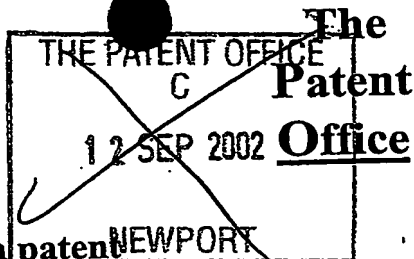
*Stephen Handley*

Dated

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11133P6 GB/AB

12 OCT 2002

Patent application number  
(The Patent Office will fill in this)

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Full name, address and postcode of the or of  
each applicant (underline all surnames)

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Patents ADP number (if you know it)

07921075005

If the applicant is a corporate body, give the  
country/state of its incorporation

Netherlands

Title of the invention

Carpet Cleaning Composition

Name of your agent (if you have one)

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"Address for service" in the United Kingdom  
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Country

Priority application number  
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Number of earlier application  
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Request for substantive examination (Patents Form 10/77)	One
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Date

Andrew S Brown

10 October 2002

12. Name and daytime telephone number of Person to contact in the United Kingdom

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The invention relates to a water-soluble product comprising a water-soluble polymer encasing a liquid carpet cleaning composition.

10

SUMMARY OF THE INVENTION:

The present invention relates to a product for carpet cleaning in the form of a water soluble polymer encasing a liquid carpet cleaning composition.

15

The sachet can be made of any water soluble or water dispersible polymer which can be heat sealed. The film and the member may be made of the same or different polymers. Examples of water-soluble polymers are Poly(vinylalcohol) (PVOH), cellulose derivatives such as hydroxypropyl methyl cellulose (HPMC), gelatin, poly(vinylpyrrolidone), poly(acrylic acid) or an ester thereof or poly(maleic acid) or an ester thereof. Copolymers of any of these polymers may also be used.

20

25

The following are some advantages found in this invention:

30

- A pre-dosed composition for carpet cleaning.
- The pre-dosed products prepared have high storage stability, up to 6 months at 50°C, even if the liquid contains water, at total levels of up to 50% wt.

35

2-

5       ▪ The liquid compositions have higher soil removing performance compared to current Resolve for steam machine carpet cleaning liquid, taken as a reference.

10       The products of the invention need to be soluble in water and to dissolve in a short time period, typically less than 5 minutes, without any stirring, to produce a product having low or no solid residue. A common feature of many carpet cleaning machines is the inclusion of a  
15 fine mesh which acts as a filter preventing solid material from entering and damaging the pumping mechanisms. Therefore, it is important that there are no/low solid residues in the reservoir so as to avoid any blockages.

20

      We present as a feature of the invention a method of cleaning a soiled carpet the method comprising adding to the reservoir of a carpet cleaning machine a water-soluble product comprising a liquid carpet cleaning  
25 composition encased in a water-soluble polymer, adding water to the reservoir of the carpet cleaning machine prior to or after adding the product, and operating the carpet cleaning machine on the soiled carpet.

30

      The pre-dosed composition can be added to the reservoir of the carpet cleaning machine either before or after the addition of water, preferably it is added prior to the addition of water.

35

      The term "water-soluble" is taken to include water dispersible.

3-

5       As used herein the term "free water" as defined in  
WO 02/16222, incorporated herein by reference. There is  
no direct correlation between the actual amount of water  
present in a composition and the amount of free water.  
Free water does not include water which is not available  
10 to the surrounding water-soluble polymer such as water  
held within a gelled matrix or water of solvation of any  
components present in the composition.

In order to determine the amount of free water  
15 present in a composition, a standard loss-on-drying  
determination test may be carried out. A sample of the  
composition, usually 10 g, is weighed, and then  
maintained at 60°C for 3 hours under a partial vacuum of  
200 mbar (20 kPa). The sample is then re-weighed, and  
20 the weight lost determined. In the present invention,  
the loss on drying of the composition is preferably less  
than 5 wt%, preferably less than 4, 3, 2 or 1 %w/w. Even  
more preferably the composition is anhydrous.

25       The actual amount of water present in the  
composition may be in excess of the amount of free water,  
as defined above, since the total water content includes  
water of solvation and water held within a gelled matrix.  
The total amount of water in the composition is, for  
30 example, more than 5, 10, 15, 20, 25 or 30% w/w. Total  
water levels of up to 50% w/w are preferred. The total  
water content may be less than 80% w/w, for example less  
than 70, 60, 50, 40, 30% w/w.

35       In an alternative embodiment the free water content  
may be greater than 5% w/w by the inclusion of sufficient  
components in the composition to raise the ionic strength

5 of the composition this may be achieved by the use of  
suitable compositions, such as electrolytes, that prevent  
the water being available to the water-soluble polymer,  
see WO8904282 and EP0518689.

10 In the present invention it has been surprisingly  
found that, apart from electrolytes, carboxylic polymers  
can also be useful to improve the stability of the water-  
soluble polymer, especially PVOH, with aqueous based  
compositions. Whilst not wishing to be bound by this  
15 theory it is believed that the carboxylic acid polymers,  
for example iminodisuccinic and polyaspartic acid or  
their metal salts, form an interaction with the -OH  
moieties of the PVOH polymer helping protecting the PVOH  
from any aqueous based formulation that may be contained  
20 therein.

The product provides the consumer with a convenient  
form, which is pre-dosed, avoiding the need to dilute the  
product before it is added to the machine.

25

We have developed a pre-dosed product that contains  
a composition particularly suitable for carpet cleaning  
extraction machines. These compositions comprise at least  
one builder, one surfactant and a super wetting agent.  
30 Preferably these compositions additionally comprise one  
or more of the following optional ingredients,  
antifoaming agent, solvent, fragrance, preservative,  
thickener, dye, bactericide and filler. Each optional  
ingredient may be present in an amount of up to 3%w/w.

35

The superwetting agent can be added to overcome the  
problem associated with the high repellancy of carpet to

5-

5 water. This is primarily caused from two sources, the first being the amount of soiling which can accumulate on carpets and, secondly, the prevalence of stain repelling treatments, which are increasingly commonly applied to carpets either during manufacture or by the consumer. In  
10 this invention a super wetting agent is a special surfactant added at levels of below 10%w/w of the composition, preferably below 5% w/w, of the composition, that can lower the surface tension of the final liquid cleaning formulation to values below 28 mN/m, when 1 to  
15 25g, ideally 2 to 12g, preferably 3 to 10g, of liquid composition is dissolved in 4 litres of water.

We present as a further feature of the invention a water-soluble product comprising a carpet cleaning  
20 composition encased in a water-soluble polymer (ideally the carpet cleaning composition comprising at least one surfactant and at least one super wetting agent wherein the combined surface tension effect of the surfactant and the super wetting agent in the composition is capable of  
25 reducing the surface tension of water below 28 mN/m when 1 to 25g, ideally 2 to 12g, preferably 3 to 10g, of the composition is dissolved in 4 litres of water).

Preferably a product is used having from 1 to 25g of  
30 liquid carpet cleaning composition per machine, ideally from 2 to 12g, and preferably from 3 to 10g.

### Builders

35 The carpet cleaning composition comprises at least one builder active or a combination of builders from 1 to 90 % w/w, preferably from 65 to 85 % w/w. Preferably the



- 5 builder is soluble or miscible with the liquid carpet cleaning composition.

Suitably carboxylate compounds are used and include the monomeric polycarboxylates, or their acid forms and  
10 polymeric polycarboxylic acids or their salts. Polymeric polycarboxylic acids are preferred for the reasons given above, in terms of protecting the water-soluble polymer.

The carboxylate builder can be monomeric or  
15 polymeric in type, monomeric polycarboxylates are generally preferred for reasons of cost and performance.

Suitable and preferred polymeric polycarboxylic acids are iminosuccinic acid or polyaspartic acid,  
20 mixtures thereof or their metal/amino salts. Examples of these polymers are Baypure CX 100/34 % and Baypure DS 100/40 % supplied from Bayer.

Suitable carboxylates containing one carboxy group  
25 include the water soluble salts of lactic acid, glycolic acid and ether derivatives thereof. Polycarboxylates containing two carboxy groups include the water-soluble salts of succinic acid, malonic acid, (ethylenedioxy) diacetic acid, maleic acid, diglycolic acid, tartaric  
30 acid, tartronic acid and fumaric acid, as well as the ether carboxylates and the sulfinyl carboxylates. Polycarboxylates containing three carboxy groups include, in particular, water-soluble citrates, aconitrates and citraconates as well as succinate derivatives such as the  
35 carboxymethloxysuccinates described in GB-A-1,379,241, lactoxysuccinates described in GB-A-1,389,732, and aminosuccinates described in NL-A-7205873, and the

- 5 oxypolycarboxylate materials such as 2-oxa-1,1,3-propane tricarboxylates described in GB-A-1,387,447.

Polycarboxylate containing four carboxy groups include oxydisuccinates disclosed in GB-A-1,261,829, 1,1,2,2-ethane tetracarboxylates, 1,1,3,3-propane tetracarboxylates and 1,1,2,3-propane tetracarboxylates. Polycarboxylates containing sulfo substituents include the sulfosuccinate derivatives disclosed in GB-A-1,398,421, GB-A-1,398,422 and US-A-3,936,448, and the  
15 sulfonated pyrrolidone citrates described in GB-A-1,439,000.

Alicyclic and heterocyclic polycarboxylates include cyclopentane-cis,cis,cis-tetracarboxylates, cyclopentadienide pentacarboxylates, 2,3,4,5,6-hexane -  
20 hexacarboxylates and carboxymethyl derivatives of polyhydric alcohols such as sorbitol, mannitol and xylitol. Aromatic polycarboxylates include mellitic acid, pyromellitic acid and the phthalic acid derivatives disclosed in GB-A-1,425,343.

25 Of the above, the preferred polycarboxylates are hydroxycarboxylates containing up to three carboxy groups per molecule, more particularly citrates.

30 More preferred are the polymer builders, i.e. polymeric polycarboxylic acid, which are homo-polymers, copolymers and multiple polymers of acrylic, fluorinated acrylic, sulfonated styrene, maleic anhydride, metacrylic, isobutylene, styrene and ester monomers. Examples of these  
35 polymers are Acusol supplied from Rohm & Haas, Syntran supplied from Interpolymer and Versa and Alcosperse

5 series supplied from Alco Chemical, a National Starch & Chemical Company.

Suitable builders are bicarbonates, sesquicarbonates, borates, phosphates, phosphonates, and mixtures of any of  
10 thereof.

Water-soluble phosphonate and phosphate builders are useful for this invention. Examples of phosphate builders are the alkali metal tripolyphosphates, sodium potassium  
15 and ammonium pyrophosphate, sodium and potassium and ammonium pyrophosphate, sodium and potassium orthophosphate sodium polymeta/phosphate in which the degree of polymerisation ranges from 6 to 21, and salts of phytic acid.

20

Specific examples of water-soluble phosphate builders are the alkali metal tripolyphosphates, sodium potassium and ammonium pyrophosphate, sodium and potassium and ammonium pyrophosphate, sodium and potassium orthophosphate,  
25 sodium polymeta/phosphate in which the degree of polymerization ranges from 6 to 21, and salts of phytic acid.

Examples of bicarbonate and carbonate builders are the  
30 alkaline earth and the alkali metal carbonates, including sodium carbonate and sesqui-carbonate and mixtures thereof. Other examples of carbonate type builders are the metal carboxy glycine and metal glycine carbonate.

35

Surfactants:

5        Examples of surfactants considered in this invention are either anionic, non-ionic or cationic. Preferred total levels of surfactant are from 0.1 to 70% w/w, ideally from 1 to 30% wt and preferably between 5 to 20% w/w.

10

      Examples of non-ionic surfactant are described in the formula  $RO(CH_2CH_2O)_nH$  wherein R is a mixture of linear, even carbon-number hydrocarbon chains ranging from  $C_{12}H_{25}$  to  $C_{16}H_{33}$  and n represents the number of  
15 repeating units and is a number of from about 1 to about 12. Examples of other non-ionic surfactants include higher aliphatic primary alcohols containing about twelve to about 16 carbon atoms which are condensed with about three to thirteen moles of ethylene oxide.

20

      Other examples of non-ionic surfactants include primary alcohol ethoxylates (available under the Neodol tradename from Shell Co.), such as  $C_{11}$  alkanol condensed with 9 moles of ethylene oxide (Neodol 1-9),  $C_{12-13}$   
25 alkanol condensed with 6.5 moles ethylene oxide (Neodol 23-6.5),  $C_{12-13}$  alkanol with 9 moles of ethylene oxide (Neodol 23-9),  $C_{12-15}$  alkanol condensed with 7 or 3 moles ethylene oxide (Neodol 25-7 or Neodol 25-3),  $C_{14-15}$  alkanol condensed with 13 moles ethylene oxide (Neodol  
30 45-13),  $C_9-11$  linear ethoxylated alcohol, averaging 2.5 moles of ethylene oxide per mole of alcohol (Neodol 91-2.5), and the like.

      Other examples of non-ionic surfactants suitable for  
35 use in the present invention include ethylene oxide condensate products of secondary aliphatic alcohols containing 11 to 18 carbon atoms in a straight or

5 branched chain configuration condensed with 5 to 30 moles  
of ethylene oxide. Examples of commercially available  
non-ionic detergents of the foregoing type are C11-15  
secondary alkanol condensed with either 9 moles of  
ethylene oxide (Tergitol 15-S-9) or 12 moles of ethylene  
10 oxide (Tergitol 15-S-12) marketed by Union Carbide, a  
subsidiary of Dow Chemical.

Octylphenoxy polyethoxyethanol type non-ionic  
surfactants, for example, Triton X-100, as well as amine  
15 oxides can also be used as a non-ionic surfactant in the  
present invention.

Other examples of linear primary alcohol ethoxylates  
are available under the Tomadol tradename such as, for  
20 example, Tomadol 1-7, a C11 linear primary alcohol  
ethoxylate with 7 moles EO; Tomadol 25-7, a C12-C15  
linear primary alcohol ethoxylate with 7 moles EO;  
Tomadol 45-7, a C14-C15 linear primary alcohol ethoxylate  
with 7 moles EO; and Tomadol 91-6, a C9-C11 linear  
25 alcohol ethoxylate with 6 moles EO.

Amine oxides can also be used as the non-ionic  
surfactant of the present invention. Exemplary useful  
amine oxide compounds may be defined as one or more of  
30 the following of the four general classes:

(1) Alkyl di (lower alkyl) amine oxides in which  
the alkyl group has about 6-24, and preferably 8-18  
carbon atoms, and can be straight or branched chain,  
saturated or unsaturated. The lower alkyl groups include  
35 between 1 and 7 carbon atoms, but preferably each include  
1 - 3 carbon atoms. Examples include octyl dimethyl  
amine oxide, lauryl dimethyl amine oxide, myristyl

5 dimethyl amine oxide, and those in which the alkyl group is a mixture of different amine oxides, such as dimethyl cocoamine oxide, dimethyl (hydrogenated tallow) amine oxide, and myristyl/palmityl dimethyl amine oxide;

10 (2) Alkyl di (hydroxy lower alkyl) amine oxides in which the alkyl group has about 6-22, and preferably 8-18 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples include bis-(2-hydroxyethyl) cocoamine oxide, bis(2-hydroxyethyl) tallowamine oxide; and bis-(2-hydroxyethyl) stearylamine  
15 oxide;

(3) Alkylamidopropyl di(lower alkyl) amine oxides in which the alkyl group has about 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or unsaturated. Examples include  
20 cocoamidopropyl dimethyl amine oxide and tallowamidopropyl dimethyl amine oxide; and

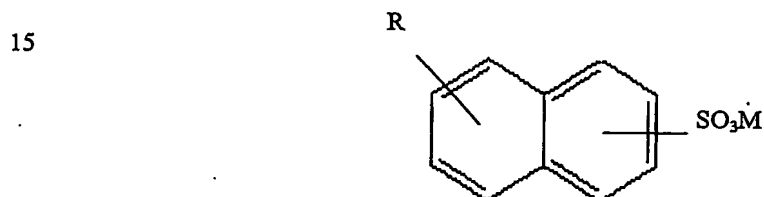
(4) Alkylmorpholine oxides in which the alkyl group has about 10-20, and preferably 12-16 carbon atoms, and can be straight or branched chain, saturated or  
25 unsaturated.

Useful anionic surfactant are frequently provided in a salt form, such as alkali metal salts, ammonium salts, amine salts, amino alcohol salts or magnesium salts.  
30 Contemplated as useful are one or more sulfate or sulfonate compounds including: alkyl sulfates, alkyl ether sulfates, alkylamidoether sulfates, alkyl benzene sulfates, alkyl benzene sulfonates, alkylaryl polyether sulfates, monoglyceride sulfates, alkylsulfonates,  
35 alkylamide sulfonates, alkylarylsulfonates, olefinsulfonates, paraffin sulfonates, alkyl sulfosuccinates, alkyl ether sulfosuccinates, alkylamide

12-

5 sulfosuccinates, alkyl sulfosuccinamate, alkyl  
 sulfoacetates, alkyl carboxylates, alkyl phosphates,  
 alkyl ether phosphates, acyl sarconsinates, acyl  
 isethionates, and N-acyl taurates. Generally, the alkyl  
 or acyl radical in these various compounds comprise a  
 10 carbon chain containing 12 to 20 carbon atoms.

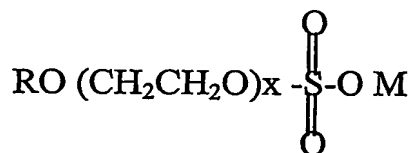
Other examples of anionic surfactants are also alkyl  
 naphthalene sulfonate anionic surfactants of the formula:



20 wherein R is a straight chain or branched alkyl chain  
 having from about 1 to about 25 carbon atoms, saturated  
 or unsaturated, and the longest linear portion of the  
 alkyl chain is 15 carbon atoms or less on the average, M  
 is a cation which makes the compound water soluble  
 25 especially an alkali metal such as sodium or magnesium,  
 ammonium or substituted ammonium cation.

Other examples are alkyl sarcosinate, sulfosuccinate  
 and alkyl sulfate anionic surfactants of the formula

30



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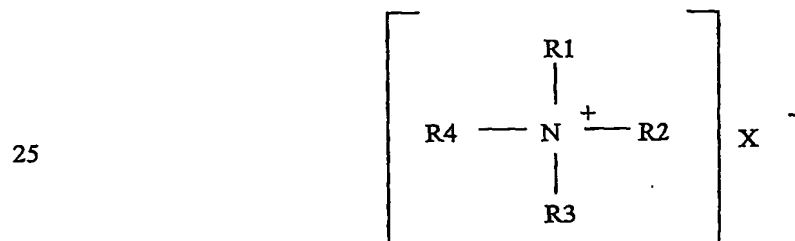
wherein R is a straight chain or branched alkyl chain  
 having from about 8 to about 18 carbon atoms, saturated  
 or unsaturated, and the longest linear portion of the  
 40 alkyl chain is 15 carbon atoms or less on the average, M

13-

5 is a cation which makes the compound water soluble especially an alkali metal such as sodium or magnesium, ammonium or substituted ammonium cation, and x is from 0 to about 4. Most preferred are the non-ethoxylated C12-15 primary and secondary alkyl sulfates, especially  
 10 sodium lauryl sulfate.

Most desirably, the anionic surfactant according to constituent is selected to be of a type that dries to a friable powder. This facilitates their removal from  
 15 carpets and carpet fibres, such as by brushing or vacuuming.

The cationic surfactants of the invention are quaternary ammonium salts which may be characterised by  
 20 the general structural formula:



wherein R1, R2, R3 and R4 are independently selected from alkyl, aryl or alkylaryl substituent of from 1 to 26  
 30 carbon atoms, and the entire cation portion of the molecule has a molecular weight of at least 165. The alkyl substituents may be long-chain alkyl, long-chain alkoxyaryl, long-chain alkylaryl, halogen-substituted long-chain alkylaryl, long-chain alkylphenoxyalkyl and  
 35 arylalkyl. The remaining substituents on the nitrogen atoms other than the above mentioned alkyl substituents are hydrocarbons usually containing no more than 12 carbon atoms. The substituents R1, R2, R3 and R4 may be



14 -

5 straight-chained or may be branched, but are preferably straight-chained, and may include one or more amide, ether or ester linkages.

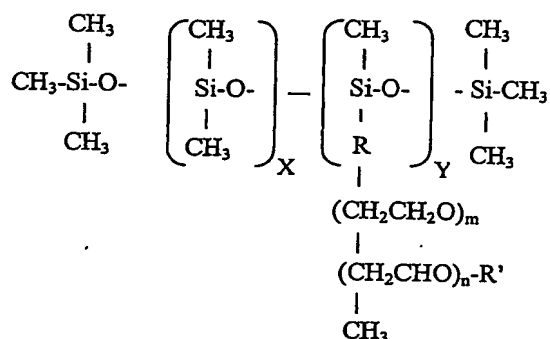
The counterion X- are selected from halogens anions, saccharinate, alkyl and alkyl benzene sulfate, sulfonate  
10 and fatty acid.

### Super wetting agents

The super wetting agents of this invention are  
15 present at levels of from 0.1 to 10% w/w, ideally 0.5 to 5% w/w, and are selected from silicone glycol copolymers and fluorsurfactants.

The silicone glycol copolymers are described by the following formula:

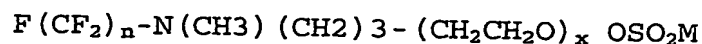
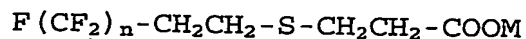
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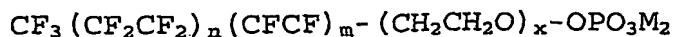
25

Where x, y, m and n are whole number ranging from 0 to  
25. X is preferred between 0-10 and y, m and n between 0-  
5. R and R' are straight chain or branched alkyl chain  
30 having from about 1 to about 25 carbon atoms, saturated  
or unsaturated, and the longest linear portion of the  
alkyl chain is 15 carbon atoms or less on the average.  
The fluorinated surfactant is described in the following  
formulae:

35



5



Wherein n, m and x are integers having a value from 0 to 15; preferred values are between 1 and 12. M is a cation which makes the compound water-soluble especially an alkali metal such as sodium or magnesium, ammonium or substituted ammonium cation.

The super wetting agents described are able to low the surface tension in water at values below 25 mN/m, in the range between 18 and 25 mN/m at concentrations of 0.0001 to 1% w/v, preferably between 0.001 to 0.1% w/v.

#### Antifoaming

Antifoaming agents are an important addition to carpet cleaning compositions of this invention, they are used at a level between 0.01 and 5%w/w. A very high foam level may not allow the carpet cleaning machine to function properly and tends to reduce the mechanical action of the carpet cleaner machine brushes, thus having a detrimental impact on soil removal. Antifoaming agents are also considered important components of this invention. Examples are polydimethylsiloxanes, preferably in combination with hydrophobic silica.

30

#### Solvents:

Organic solvents should be water-miscible or water emulsionable. The organic solvent is found at levels of 0.01 to 60% w/v, more preferably between 0.1 to 30% w/w. The organic solvent constituent of the inventive compositions include one or more alcohols, glycols, acetates, ether acetates, glycol ethers and hydrocarbons. Exemplary alcohols useful in the compositions of the

5 invention include C2-C8 primary and secondary alcohols  
which may be straight chained or branched. Exemplary  
alcohols include pentanol and hexanol. Exemplary glycol  
ethers include those glycol ethers having the general  
structure Ra-O-Rb-OH, wherein Ra is an alkoxy of 1 to 20  
10 carbon atoms, or aryloxy of at least 6 carbon atoms, and  
Rb is an ether condensate of propylene glycol and/or  
ethylene glycol having from 1 to 10 glycol monomer units.  
Preferred are glycol ethers having 1 to 5 glycol monomer  
units.

15

By way of further non-limiting example specific  
organic constituents include propylene glycol methyl  
ether, dipropylene glycol methyl ether, tripropylene  
glycol methyl ether, propylene glycol n-propyl ether,  
20 ethylene glycol n-butyl ether, diethylene glycol n-butyl  
ether, diethylene glycol methyl ether, propylene glycol,  
ethylene glycol, isopropanol, ethanol, methanol,  
diethylene glycol monoethyl ether acetate and  
particularly useful is , propylene glycol phenyl ether,  
25 ethylene glycol hexyl ether, diethylene glycol hexyl  
ether. Examples of hydrocarbons solvents are linear and  
branched, saturated and unsaturated carbon chain with a  
number of carbon atoms from C4-C40, preferably from C6-  
C22.

30

#### Process manufacturing:

In one embodiment, a compartment of water-soluble  
35 polymer is formed by moulding of a water-soluble polymer,  
especially one produced by injection moulding or blow  
moulding, such as described in WO 0136290. The

5 compartment may have a wall thickness of, for example, greater than 100  $\mu\text{m}$ , for example greater than 150  $\mu\text{m}$  or greater than 200  $\mu\text{m}$ , 300  $\mu\text{m}$ , 500  $\mu\text{m}$ , 750  $\mu\text{m}$  or 1mm. Preferably, the wall thickness is from 200 to 400 $\mu\text{m}$ .

10 In an alternative embodiment the compartment may, for example, be formed of a film of the water-soluble polymer. The film may be a single film, or a laminated film as disclosed in GB-A-2,244,258. While a single film may have pinholes, the two or more layers in a laminate  
15 are unlikely to have pinholes that coincide.

The film may be produced by any process, for example by extrusion and blowing or by casting. The film may be unoriented, monoaxially oriented or biaxially oriented.  
20 If the layers in the film are oriented, they usually have the same orientation, although their planes of orientation may be different if desired.

The layers in a laminate may be the same or  
25 different. Thus they may each comprise the same polymer or a different polymer.

Examples of water-soluble polymers which may be used in a single layer film or in one or more layers of a  
30 laminate or which may be used for injection moulding or blow moulding are poly(vinyl alcohol) (PVOH), cellulose derivatives such as hydroxypropyl methyl cellulose (HPMC) and gelatin. An example of a preferred PVOH is ethoxylated PVOH. The PVOH may be partially or fully  
35 alcoholised or hydrolysed. For example it may be from 40 to 100%, preferably from 70 to 92%, more preferably about 88% or about 92%, alcoholised or hydrolysed. The degree

5 of hydrolysis is known to influence the temperature at which the PVOH starts to dissolve in water. 88% hydrolysis corresponds to a film soluble in cold (ie room temperature) water, whereas 92% hydrolysis corresponds to a film soluble in warm water.

10

The thickness of the film used to produce the container, is preferably 40 to 300  $\mu\text{m}$ , more preferably 80 to 200  $\mu\text{m}$ , especially 100 to 160  $\mu\text{m}$ , more especially 100 to 150  $\mu\text{m}$  and most especially 120 to 150  $\mu\text{m}$ .

15

In one embodiment, the film is vacuum formed or thermoformed into a compartment for the first composition, such as described in WO 0216207 For example, in a thermoforming process the film may be drawn down or  
20 blown down into a mould. Thus, for example, the film is heated to the thermoforming temperature using a thermoforming heater plate assembly, and then drawn down under vacuum or blown down under pressure into the mould. Plug-assisted thermoforming and pre-stretching the film,  
25 for example by blowing the film away from the mould before thermoforming, may, if desired, be used. One skilled in the art can choose an appropriate temperature, pressure or vacuum and dwell time to achieve an appropriate shape. The amount of vacuum or pressure and  
30 the thermoforming temperature used depend on the thickness and porosity of the film and on the polymer or mixture of polymers being used. Thermoforming of PVOH films is known and described in, for example, WO 00/55045 and WO 01/85898.

35

A suitable forming temperature for PVOH or ethoxylated PVOH is, for example, from 90 to 130°C,

5 especially 90 to 120°C. A suitable forming pressure is,  
for example, 69 to 138kPa (10 to 20 p.s.i.), especially  
83 to 117 kPa (12 to 17 p.s.i.). A suitable forming  
vacuum is 0 to 4 kPa (0 to 40 mbar), especially 0 to 2  
kPa (0 to 20 mbar). A suitable dwell time is, for  
10 example, 0.4 to 2.5 seconds, especially 2 to 2.5 seconds.

While desirably conditions chosen within the above  
ranges, it is possible to use one or more of these  
parameters outside the above ranges, although it may be  
15 necessary to compensate by changing the values of the  
other two parameters.

Once formed, the compartment may be filled with the  
liquid carpet cleaning composition. The compartment may  
20 be completely filled or only partially filled. The liquid  
composition may be thickened or gelled, if desired. More  
preferably, the composition is a transparent liquid,  
especially, a coloured, transparent liquid. The liquid  
composition may be non-aqueous or aqueous, although  
25 preferably comprising less than 5% free water as defined  
in WO 02/16222. The composition may have more than one  
phase. For example it may comprise an aqueous  
composition and a liquid composition that is immiscible  
with the aqueous composition. It may also comprise a  
30 liquid composition and a separate solid composition, for  
example in the form of a ball, pill or speckles.

The compartment is sealed with a sealing member and  
may be sealed together by any suitable means, for example  
35 by means of an adhesive or by heat sealing. Mechanical  
means is particularly appropriate if both have been  
prepared by injection moulding. Other methods of sealing

5 include infra-red, radio frequency, ultrasonic, laser, solvent, vibration and spin welding. An adhesive such as an aqueous solution of PVOH may also be used. The seal desirably is water-soluble if the containers are water-soluble.

10

If heat sealing is used, a suitable sealing temperature is, for example, 120 to 195°C, for example 140 to 150°C. A suitable sealing pressure is, for example, from 250 to 600 kPa. Examples of sealing  
15 pressures are 276 to 552 kPa (40 to 80 p.s.i.), especially 345 to 483 kPa (50 to 70 p.s.i.) or 400 to 800 kPa (4 to 8 bar), especially 500 to 700 kPa (5 to 7 bar) depending on the heat sealing machine used. Suitable sealing dwell times are 0.4 to 2.5 seconds.

20

One sealing member is made also from a water-soluble polymer, although not necessarily of the same water-soluble polymer as the compartment. The sealing member may be a film or a moulded piece.

25

One skilled in the art can use an appropriate temperature, pressure and dwell time to achieve a seal of the desired integrity. While desirably conditions are chosen within the above ranges, it is possible to use one  
30 or more of these parameters outside the above ranges, although it would might be necessary to compensate by changing the values of the other two parameters.

The containers may themselves be packaged in outer  
35 containers if desired, for example non-water soluble containers which are removed before the water-soluble containers are used.

5

The containers produced by the process of the present invention, may have a maximum dimension of 5 cm, excluding any flanges. For example, a container may have a length of 1 to 5 cm, especially 3.5 to 4.5 cm, a width of 1.5 to 3.5 cm, especially 2 to 3 cm, and a height of 1 to 2 cm, especially 1.25 to 1.75 cm.

#### SURFACE TENSION MEASUREMENTS:

15 The surface tension has been measured with a tensiometer, by the ring method. A platinum ring is immersed in 12 French degree water solution maintained at 20°C, where previously has been dissolved a tablet. The ring is taken out slowly from the liquid. When the ring is near the air/liquid interface, it is balance by the  
20 tensiometer the force for the ring extraction. The maximum force versus area gained before breaking the liquid film formed is the surface tension of the liquid formula.

25 The lower the surface tension expressed in mN/m, the better the formula performance in terms of wettability on carpet surface.

A surface tension target value for the composition is below 28 mN/m.

30

#### Evaluation Test

The compositions have been evaluated in terms of storage stability, dissolution time in warm water (T=40°C), remaining residue after dissolution and soil  
35 removal performance versus Resolve™ for steam machine taken as a reference of the machine carpet cleaner products.



5

STORAGE STABILITY TEST:

Two containers for each condition were stored at 5°C, 25°C and 50°C in climatic cells. The change in the appearance of the container and the weight changes are monitored after 2 weeks, 1 month, 3 months and 6.

A recording data table with the corresponding storage stability rating is reported below:

15

Storage rating	Liquid appearance	Film appearance	Weight loss (g)
0	No separation	No difference from reference film.	No weight loss
1	No separation	Slightly humid and flexible	Less than 1% weight loss
2	Separation	Slightly humid and flexible	Less than 1% weight loss
3	No separation	Slightly humid and flexible	Weight loss between 1-5%
4	Separation	Slightly humid and flexible	Weight loss between 1-5%
5	No separation	Humid and flexible	More than 5% weight loss
6	Separation	Humid and flexible	More than 5% weight loss
7	No separation	Very humid and flexible	More than 5% weight loss
8	Separation	Very humid and flexible	More than 5% weight loss

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9	-	The film is broken -- evident leakage	-
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5

The higher the rating number then the worse is the stability of the composition.

#### 10 DISSOLUTION AND RESIDUE EVALUATION TEST:

One container of 8 ml of composition is dissolved in a beaker containing  $\frac{1}{2}$  gallon of warm water ( $T=40^{\circ}\text{C}$ ) with stirring and without stirring. The dissolution time as well as the remaining film residue quantity are recorded.

Dissolution rating	Dissolution time	Film residue percentage
0	More than 30 minutes	100% wt
1	Between 10 - 30 minutes	Between 20% wt
2	More than 10 minutes	More than 10% wt
3	Between 5 and 10 minutes	More than 10% wt
4	Between 5 and 10 minutes	Between 5 and 10 % wt
5	Between 5 and 10 minutes	Between 5 and 10 % wt
6	Less than 5 minutes	Between 5 and 10 % wt
7	Less than 5 minutes	Less than 5 % wt

24 -

- 5 The higher the rating number then the better is the dissolution behaviour of the container.

SOIL REMOVAL TEST:

10 This method has been designed for the evaluation of soil removal performance of extraction cleaner formulations.

The soil has the following composition:

	- Soil components:	% by weight
15	- Peat Moss	47.7
	- Cement	21.4
	- Kaolin clay	8.0
	- Silica	8.0
	- Red Iron oxide	1.3
20	- Charcoal	12.6
	- Mineral oil	1.0

A nylon carpet is used for the test.

25

The carpet is soiled with 5 grams of standard soil. The soil is applied 1 gram once by strainer. The soiled carpet is then put with 4 kg of steel beads in a jar mill and stirred for 30 minutes at 56 rpm.

30

The containers are dissolved in warm tap water ( $T = 40^{\circ}\text{C}$ ). The Resolve for steam machine is diluted according to its labelling instructions.

35

Carpet is cleaned with appropriate machine/product using 4 wet strokes (dispensing solution) and 2 dry strokes (vacuuming up solution).

Carpet swatches are placed in a dark room temperature chamber ( $25^{\circ}\text{C} / 50\%\text{RH}$ ) for 24 hours while they dry.

40

25 -

5 The cleaning performance is evaluated by measuring the carpet with a portable spectrophotometer before soiling, after soiling and after the cleaning process. The result is reported as soil removal percentage versus current Resolve steam machine liquid taking 100 as a  
10 reference.

### EXAMPLES:

The liquids are typically prepared by mixing all the  
15 components together in a suitable container to form a concentrate. The liquid concentrates are then filled in PVOH film pockets and heat sealed by using a Magic Vac Elite machine. The heat sealing process is carried out at 150°C and 1 bar pressure. PVOH films used in the present  
20 invention are L712D obtained from Aquafilm ltd, UK) having a thickness of 120µm and M8630 obtained from Chris Craft having a thickness of 76µm

Examples of compositions forming a part of the  
25 present invention are set forth below in Table 1 and 2; with various components identified in Table 3.

Components	<u>Table 1</u>				
	Ex 1	Ex 2	Ex 3	Ex 4	Ex 5
	%	%	%	%	%
Baypure CX100/34	64.14	64.14			63.75
Baypure DS100/40	7.84	7.84			7.88
Trilon B			37.41		
Trilon BS acid			3.54		
Citric acid	5.88	5.88		0.63	5.63
Petro 11 powder	14.70	14.70	5.67	33.13	15.00
Genapol 26-L-60			9.36	3.13	

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Syntran 1580			7.33		
Syntran 4015				62.50	
Dowanol PnP			34.60		
Propylene glycol	5.94	7.44			
PEG 400					6.25
Fragrance	1.50		1.85	0.63	1.50
SE 21			0.23		
Water added*	0.00	0.00	0.00	0.00	0.00
Water content	47.04	47.04	27.33	60.31	46.80

5

\*The water is contained in some raw materials as CX 100/34, DS100/40, Syntran 1580, SE21 and Trilon B.

10

	<b>Table 2</b>				
Components	Ex 6	Ex 7	Ex 8	Ex 9	Ex 10
	%	%	%	%	%
Baypure CX100/34	37.50		50.00	63.75	62.62
Baypure DS100/40	8.22		4.38	7.88	7.66
Trilon B	3.75	32.44			
Trilon BS acid		3.07			
Citric acid			3.75	5.63	5.55
Petro 11 powder	15.62	4.92	18.75	15.00	14.14
Genapol 26-L-60	2.06	8.13			
Syntran 1580		6.50			
Propylene glycol	31.25	13.15	21.63	6.25	6.13
M-Pyrol		30.00			
Fragrance	1.60	1.60	1.50	1.50	1.43
SE 21		0.20			
Aerosil 200 powd.					2.46
Water added*	0.00	0.00	0.00	0.00	0.00
Water content	31.34	23.93	35.63	46.80	47.38

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- 5 \*The water is contained in some raw materials as CX 100/34, DS100/40, Syntran 1580, SE21 and Trilon B.

	<b>Table 3</b>
Component	Description of component
Baypure CX100/34	Iminosuccinic sodium salt from Bayer
Baypure DS100/40	Polyaspartic acid sodium salt from Bayer
Trilon B	EDTA tetrasodium salt 40% from Basf
Trilon BS acid	EDTA acid powder from Basf
Citric acid	Citric acid
Petro 11 powder	Alkyl naphthalene sulfonate from Witco
Genapol 26-L-60	Alkylethoxylate
Propylene glycol	Propylene glycol
M-Pyrol	1-methyl 2-pyrrolidinone from ISP
Fragrance	Fragrances from various supplier
Aerosil 200 powd.	Amorphous silica from Degussa
Syntran 1580	Acrylic copolymer from Interpolymer
Syntran 4015	Acrylic copolymer from Interpolymer
SE 21	Silicone antifoaming agent from Wacker
Dowanol PnP	1-Propoxy-2-propanol from Dow chem
PEG 400	Polyethylene glycol from Basf

10 EXAMPLE RESULTS:

The products were tested in terms of storage stability, dissolution time and soil removal performance.

15 Results for storage stability test:

8 ml gel caps have been used for storage stability.

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Product	Stability test rating											
	2 weeks			1 month			3 months			6 months		
	5°C	25°C	50°C	5°C	25°C	50°C	5°C	25°C	50°C	5°C	25°C	50°C
Ex 1 (M8634)	1	1	1	1	1	3	1	3	3	2	5	5
Ex 2 (M8634)	0	1	1	0	1	3	1	5	5	1	5	9
Ex 3 (M8634)	3	9	9	-	-	-	-	-	-	-	-	-
Ex 4 (M8634)	8	9	9	-	-	-	-	-	-	-	-	-
Ex 5 (M8634)	2	5	5	2	9	9	-	-	-	-	-	-
Ex 6 (M8634)	5	9	9	-	-	-	-	-	-	-	-	-
Ex 7 (M8634)	9	9	9	-	-	-	-	-	-	-	-	-
Ex 8 (M8634)	1	1	3	1	3	3	1	5	5	1	8	8
Ex 9 (M8634)	1	1	1	1	1	1	1	3	3	1	3	3
Ex 9 (L712)	1	9	9	-	-	-	-	-	-	-	-	-
Ex 10 (M8634)	1	1	1	1	1	2	1	1	2	1	1	2

5

Results for dissolution test:

Product	Dissolution test			
	with stirring		without stirring	
	M8634	L712	M8634	L712
Ex 9	6	3	5	2
Ex 10	6	-	6	-

Results for soil removal test:

10

The data are compared with the Resolve for steam machine liquid formulation taken as a reference of 100 of soil removal. The Resolve for steam machine product has been diluted 4 oz/gall according to its labelling instruction.

15

Product	Soil removal test	
	1 gel cap/gall	2 gel caps/gall
Ex 1	89	-
Ex 2	96	-

29

Ex 8	61	-
Ex 9	145	120
Ex 10	135	-



## 5 CLAIMS

1. A method of cleaning a soiled carpet the method comprising adding to the reservoir of a carpet cleaning machine a water soluble product comprising  
10 a liquid carpet cleaning composition encased in a water soluble polymer, adding water to the reservoir of the carpet cleaning machine prior to or after adding the water soluble product, and operating the carpet cleaning machine on the soiled carpet.  
15
2. A method as claimed in claim 1 wherein the water soluble product is added to the reservoir of the carpet cleaning machine prior to adding the water.
- 20 3. A method as claimed in claim 2 or claim 3 wherein the liquid carpet cleaning composition contains up to 50%w/w of free water.
4. A method as claimed in claim 3 wherein the  
25 composition additionally contains at least one builder.
5. A method as claimed in any claim from 1 to 4 wherein the carpet cleaning composition comprises at least  
30 one surfactant and one super wetting agent and wherein the combined effect of the surfactant and the super wetting agent in the composition is capable of reducing the surface tension of water below 28 mN/m when 1 to 30 g of the carpet cleaning  
35 composition is dissolved in 4 litres of water.
6. A water-soluble carpet cleaning products comprising

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5 a liquid carpet cleaning composition encased in a  
water-soluble polymer the liquid carpet cleaning  
composition having at least one surfactant and  
optionally one super wetting agent wherein the  
combined surface tension effect of the surfactant  
10 and the super wetting agent in the composition is  
capable of reducing the surface tension of water  
below 28 mN/m when 1 to 25 g of the liquid carpet  
cleaning composition is dissolved in 4 litres of  
water

15

7. A water-soluble carpet cleaning product as claimed  
in claim 6, wherein carpets cleaning liquid  
composition additionally comprises an antifoaming  
agent, a solvent, a thickener, a dye and a  
20 fragrance.

8. A water-soluble carpet cleaning product as claimed  
in any claim from 6 to 8 wherein the water-soluble  
polymer is poly(vinyl alcohol).

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Abstract

CARPET CLEANING COMPOSITION

The invention relates to a water-soluble product  
10 comprising a water-soluble polymer encasing a liquid  
carpet cleaning composition.

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